We claim

1. An all optical wireless communication system including: A transmitter that receives wavelength l1 and down converts it to wavelength l2>l1 for transmission through the atmosphere. A receiver where the radiation l2 is up converted back to wavelength l1. The transmitter and receiver include a non-linear crystal, a laser pump and collimating optics.
2. A system like in claim 1 where the non-linear elements are formed from quasi-phase matched crystals sintered together.
3. A system like in claim 1 that includes both transmitter and receiver elements in each side of the transmission range.
4. A system like in claim 1 where same crystal, same pump laser or same optics are used for the up and down conversion functions.
5. A system like in claim 1 where l1 is in the near infrared and l2 is in the mid Infrared. wavelength.
6. A system like in claim 1 where l1 is in the near infrared and l2 is in the Thz wavelength atmospheric channel.
7. A system like in claim 1 where the down conversion is performed by the difference frequency generation and the up conversion is performed by the sum frequency generation.
8. A system like in claim 1 but with output wavelength l2 not equal to l1, but shifted to a different wavelength.

1) D. Zheng, L.A.Gordon, Y.S.Wu,R.S.Feigelson, M.M.Fejer, R.L.Byer, K.L.Vodopyanov.16 micron infrared generation by difference frequency mixing in diffusion bonded stacked GaAs,Opt.Lett.Vol.23, p.1010-1012 (1998)

2) Yoo. S.J.B. Polarization independent multi-channel wavelength conversion by difference frequency generation in AlGaAs waveguides, Proc. SPIE Vol. 3491. p. 39-44, (1998)).